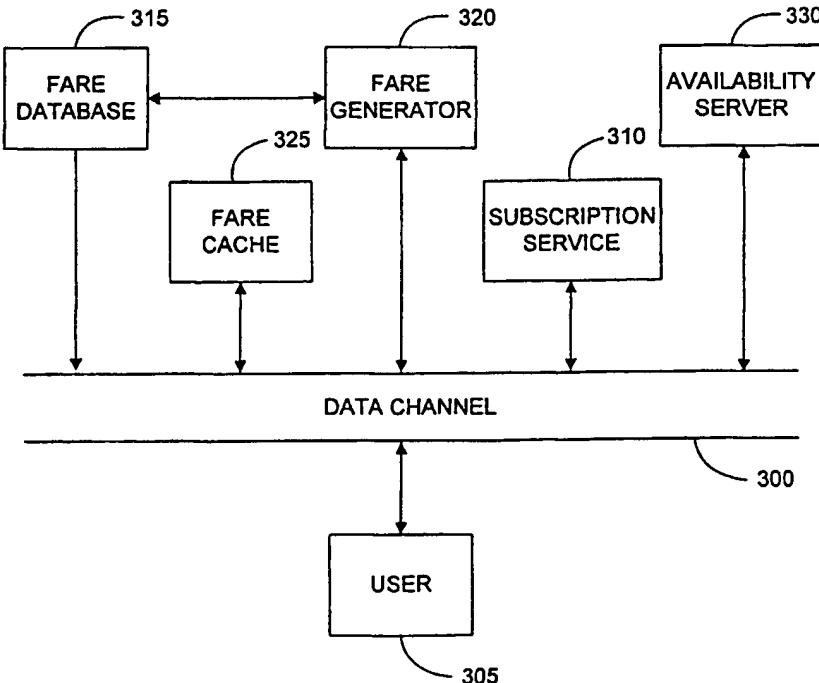## PCT

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(57) Abstract

A network equipped with methods for distributing travel fare and travel availability information as well as changes therein to users. In accordance with one aspect of the invention, a method for distributing travel fare and travel availability information, comprises the steps of providing a data channel in the network for transmitting and receiving information among information providers and information users, receiving registration requests to obtain information on changes in travel fare information and travel availability information, and transmitting on the data channel from at least one of the information providers information on changes in the travel fare information and the travel availability information based on the registration requests. In accordance with another aspect, a travel information network comprises a fare generator for providing travel fare information, an availability server for providing travel availability information, a subscription service for registering users seeking information reflecting changes in the travel fare information and the travel availability information, and a data channel for transmitting the changes in the travel fare information and the travel availability information to the registered users.

EVENT BASED SYSTEM FOR DISTRIBUTING TRAVEL INFORMATION

BACKGROUND OF THE INVENTION

A.   Field of the Invention

This invention relates to distributing information on a network and, more particularly, to event based methods and systems for distributing travel information on a data channel based on occurring events, such as changes in fares and availability.

B.   Description of the Related Art

The explosive use of Internet commerce allows businesses to better respond to customers needs by allowing their customers direct access to the business's computer system for purchasing products and services. Customers for example are now using the Internet to order books, compact disks and make travel reservations by directly placing an order or reservation with a business's computer, completely bypassing any sales agent.

By using the Internet, and specifically the World Wide Web ("Web"), the ability to interface with business computers is simplified. The architecture of the Web follows a conventional client-server model. The terms "client" and "server" are used to refer to a computer's general role as a requester of data (the client) or provider of data (the server). Under the Web environment, Web browsers reside in clients and specially formatted "Web documents" reside on Internet (Web) servers. Web clients and Web servers communicate using a protocol called "HyperText Transfer Protocol" (HTTP).

In operation, a browser opens a connection to a server and initiates a request for a document. The server delivers the requested document, typically in the form coded in a standard "HyperText Markup Language" (HTML) format. After the document is delivered, the connection is closed. The browser displays the document or performs a function designated by the document.

Every day, more people are using the Internet for commerce, including making travel reservations. Currently when utilizing the Internet for making air travel reservations, customers, through a Web browser, formulate a request to a flight reservation service. This service may be with an airline directly or a third party, which operates in conjunction with the airline to handle reservations. The customer's

request includes criteria, such as the source and destination cities, as well as the dates of travel. Most often, customers prefer to obtain information on which flights, matching their criteria, have the lowest fare.

.After receiving the request, the flight reservation service then determines which scheduled flights match the customer's criteria. First, the reservation system determines availability. As is well known, the same flight may have several different fares associated with it based on the class of service and availability is determined in part based on the fare. This requires the customer to invoke an additional request to determine the fare for an available seat.

In addition, the request for travel price and availability provided today include only a one time request. If the fares and/or availability changes, the customer is unaware of this change unless he or she places another request for flight information and again checks availability. Because many people make reservations and then cancel them, it is possible that the availability and price for the requested service will change quite often, thus creating a substantial amount of effort for a customer wishing to get the lowest price. The customer must continually check the fare and availability hoping to capture the moment when the lowest available fare is acceptable to the customer.

Accordingly, there is a need for a system and method that provides the lowest available fare without requiring a user (e.g., a customer) to enter multiple requests and automatically notifies the user of a change in the lowest available fare in the event there is a change in the fare and availability of flights that match the user's criteria.

SUMMARY OF THE INVENTION

Methods, systems, and articles of manufacture consistent with the present invention overcome the shortcomings of existing systems for determining the lowest available air fare by providing a data channel, using a publish-subscribe paradigm, that allows the determination of the lowest available air fare matching a user's criteria while providing an event driven scheme that automatically updates the user with any changes to the lowest available fare, in the event the fare or the availability changes.

In accordance with one aspect of the present invention, as embodied and broadly described herein, a method for distributing travel fare and travel availability

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information in a network, comprises steps of providing a data channel in the network for transmitting and receiving information among information providers and information users, receiving registration requests to obtain information on changes in travel fare information and travel availability information, and transmitting on the data channel from at least one of the information providers information on changes in the travel fare information and the travel availability information based on the registration requests. The travel fare information may be determined by using travel criteria supplied by in the registration request. The step of transmitting on the data channel from at least one of the information providers information on changes in the travel fare information and the travel availability may include transmitting changes in the travel fare information by a fare generator on the data channel, transmitting changes in the travel availability information by an availability server on the data channel and receiving changes in the travel fare information and travel availability information from the data channel by a fare cache. In addition, receiving changes in the travel fare information and travel availability information from the data channel by a subscription service, an additional step may include determining new travel fare information and new travel availability information in response to receiving changes in the travel fare information and travel availability information. An additional step may include transmitting on the data channel a lowest available fare derived from criteria contained in the registration request. In accordance with yet another aspect of the invention, as embodied and broadly described herein, a travel information network is provided, comprising a fare generator for providing travel fare information, an availability server for providing travel availability information, a subscription service for registering users seeking information reflecting changes in the travel fare information and the travel availability information and transmitting the changes in the travel fare information and the travel availability information to the registered users. The travel information network may also comprise a fare cache for storing travel fare information and travel availability information.

In accordance with yet another aspect of the invention, as embodied and broadly described herein, a method for distributing travel fare and travel availability information in a network is provided, comprising providing a data channel in the

network for transmitting and receiving information among information providers and information users, transmitting on the data channel from at least one of the information providers information on changes in the travel fare information and the travel availability information based on the registration requests and enabling users to access the data channel to retrieve information on changes in travel fare information and travel availability information based on registration information associated with each user. An additional step may include transmitting on the data channel a lowest available fare derived from the travel fare information and the travel availability information. The registration request may include travel criteria and the information on changes in the travel fare and travel availability information may be related to the travel criteria.

In accordance with yet another aspect of the invention, as embodied and broadly described herein, a method for distributing travel fare and travel availability information in a network is provided, comprising the steps of providing a data channel in the network for transmitting and receiving data packets among devices assigned to information providers and information users, determining whether a data packet reflects a request from an information user to receive information reflecting changes in travel fare data and travel availability data, registering the request such that when a change occurs in the travel fare data or the travel availability data, a data packet reflecting the change is provided on the data channel for receipt by at least one of the information user. The step of determining whether a data packet reflects a request from an information user may include analyzing a subject portion of the data packet. Additional steps may include transmitting the data packet on the data channel by one of the information providers, and receiving the data packet by a plurality of information providers and information users.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate an implementation of the invention and, together with the description, serve to explain the advantages and principles of the invention. In the drawings,

FIG. 1 is a pictorial diagram of a computer network in which systems consistent with the present invention may be implemented;

FIG. 2 shows a computer network containing a client system and a server system;

FIG. 3 is a pictorial diagram of component systems used in the manner consistent with an exemplary embodiment of the present invention;

FIG. 4 is a flowchart of the steps performed between a server and a client utilizing the publish-subscribe paradigm in a manner consistent with an exemplary embodiment of the present invention;

FIG. 5 is a flowchart of the steps performed by the subscription service in a manner consistent with an exemplary embodiment of the present invention;

FIG. 6 is a flowchart of the steps performed by the availability server in a manner consistent with an exemplary embodiment of the present invention;

FIG. 7 is a flowchart of the steps performed by the fare generator in a manner consistent with an exemplary embodiment of the present invention; and

FIG. 8 is a flowchart of the steps performed by the fare cache in a manner consistent with an exemplary embodiment of the present invention.

DETAILED DESCRIPTION

Reference will now be made in detail to an implementation consistent with the present invention as illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings and the following description to refer to the same or like parts.

Introduction

Systems and methods consistent with the present invention use a network for distributing travel fare and availability information on the network allowing users to access this information as well as updating users based on events, such as changes to the travel fare information and travel availability information. The network, used in accordance with the principles of the present invention, allows a single reply to multiple requests for the same or related information. This system and method allow users to receive both travel fare and availability information with a single request thereby, in one embodiment, receiving the lowest available fare information. In

addition, users can subscribe to the network such that any changes to the travel fare or travel availability information are automatically received and presented to the user.

In more detail, the network comprises a data channel and a publish-subscribe paradigm, which allows for a component to send a single reply to multiple components in response to receiving requests from the multiple components. Using the data channel, a user generates a request to a subscription service to receive the lowest available fare. The subscription service catalogs the request and publishes the request on the data channel. The fare cache receives the request and, in one embodiment, determines if a lowest available fare value matching the request is already stored in the fare cache. If the lowest available fare already exists in the fare cache's storage, the fare cache publishes this fare on the data channel.

If the lowest available fare is not stored in the fare cache, then the fare cache initiates the processing of fare and availability information in order to determine the lowest available fare. A fare generator generates fares matching travel criteria in the request and publishes the generated fare information on the data channel. The availability server publishes availability information for the fares generated by the fare generator. The fare cache correlates the fare and availability information and publishes the lowest available fare satisfying the request.

The subscription service retrieves the lowest available fare information published by the fare cache and publishes this information on the data channel for the user who initiated the request.

When a change in either the travel fare or travel availability information occurs, this change is placed on the data channel and the fare cache initiates a determination of a newer lowest available fare satisfying the user's request. If the newer lowest available fare is different from the previous one sent to the user, then the fare cache publishes the newer lowest available fare for the subscription service. The subscription service, in turn, publishes the newer lowest available fare for the user, all via the data channel.

Network Architecture

Figure 1 illustrates a conceptual diagram of a computer network 100, such as the Internet. Computer network 100 comprises small computers (such as computers

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102, 104, 106, 108, 110 and 112) and large computers (such as servers 120 and 122). In general, small computers are "personal computers" or workstations and are the sites at which a human user operates the computer to make requests for data from other computers or servers on the network. Usually, the requested data resides in large computers. In this scenario, small computers are clients and the large computers are servers.

In this specification, the terms "client" and "server" are used to refer to a computer's general role as a requester of data (client) or provider of data (server). In general, the size of a computer or the resources associated with it do not preclude the computer's ability to act as a client or a server. Further, each computer may request data in one transaction and provide data in another transaction, thus changing the computer's role from client to server, or vice versa.

A client, such as computer 102, may request a file from server A 120. Since computer 102 is directly connected to server A 120, for example, through a local area network, this request would not normally result in a transfer of data over what is shown as "network" of FIG. 1. The "network" of FIG. 1 represents, for example, the Internet, which is an interconnection of networks. A different request from computer 102 may be for a file that resides in server B 122. In this case, the data is transferred from server B 122 through the network to server A 120 and, finally, to computer 102. The distance between server A 120 and server B 122 may be very long, e.g. across continents, or very short, e.g., within the same city. Further, in traversing the network the data may be transferred through several intermediate servers and many routing devices, such as bridges and routers.

Figure 2 shows, in more detail, an example of a client-server system interconnected through network 100. In this example, a remote server system 222 is interconnected through network 100 to client system 220. Client system 220 includes conventional components such as a processor 224, memory 225 (e.g. RAM), a bus 226 which couples processor 224 and memory 225, a mass storage device 227 (e.g. a magnetic hard disk or an optical storage disk) coupled to processor 224 and memory 225 through an I/O controller 228 and a network interface 229, such as a conventional modem.

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Server system 222 also includes conventional components such as a processor 234, memory 235 (e.g. RAM), a bus 236 which couples processor 234 and memory 235, a mass storage device 237 (e.g. a magnetic or optical disk) coupled to processor 234 and memory 235 through an I/O controller 238 and a network interface 239, such as a conventional modem. It will be appreciated from the description below that the present invention may be implemented in software which is stored as executable instructions on a computer readable medium on the client and server systems, such as mass storage devices 227 and 237 respectively, or in memories 225 and 235 respectively.

While the network described with respect to Figs. 1 and 2 reference a network, and specifically the internet, it will be recognized by one skilled in the art that the network may be any topology, including private networks and internal computer structures, that allows either various computer systems or modules within a single computer system to exchange information.

Travel Information Network

Figure 3 is a pictorial diagram of component systems used in the manner consistent with an exemplary embodiment of the present invention. The components in this exemplary embodiment include the data channel 300, the user 305, the subscription service 310, the fare database 315, the fare generator 320, the fare cache 325, and the availability server 330. Each component performs the functions of either a client or server.

The data channel component 300 is the protocol mechanism by which the majority of the components depicted in FIG. 3 communicate with each other. In one embodiment of the present invention, the data channel component 300 uses a publish-subscribe paradigm (describe with more detail in FIG. 4). Components using the data channel and incorporating the publish-subscribe paradigm can pass information back and forth. The data channel 300 and publish-subscribe paradigm allow for point-to-point communications between two components as well as a component sending a single reply in response to requests from multiple components.

The user component 305 is where a request, containing travel criteria, for lowest available fares is generated by a user. This request is placed on the data

channel 300 and all other components requiring this information will receive it. The request entered by the user component 305 may be a one-time request for travel information or may be a request for an interest subscription (i.e., a registered user request) indicating the desire to receive updates of travel information. The user component 305, as with all components in FIG. 3, will contain the required hardware and software that allow it to use the publish-subscribe paradigm and the data channel.

The subscription service component 310 contains all the interest subscriptions obtained from the data channel component 300 entered by user component 305. While FIG. 3 only indicates one user component 305, it will be recognized by those skilled in the art that multiple user components may be connected to the data channel 300 and may request low fare availability information as well as interest subscriptions. The subscription service component 310 (describe with more detail in FIG. 5) manages all the interest subscriptions requested by users. Events that occur on the data channel, such as the reception of travel fare and availability information will trigger the subscription service to publish the received travel fare and availability information on the data channel for the specific user that requested such information. Additional events, such as a time-out of an interest subscription, will also trigger an action in the subscription service component.

The fares database component 315 contains fares for all the flights used by the present invention. The fares database may be populated by any manner known to one skilled in the art. For example, Airline Tariff Publishing Company information may be used to populate the fares database component 315. As fares change in the fares database, the fares database component 315 will send out an update of the fare change onto the data channel 300.

The fare generator component 320 interacts with the fares database component 315 directly as well as with the data channel component 300. The fares generator component 320 (describe with more detail in FIG. 7) determines the lowest fare using travel criteria established by the user component 305. Using this travel criteria, the fare generator component 320 directly interfaces with the fares database component 315 to determine the lowest fares for all the flights, satisfying the travel criteria,

within the fares database. The fare generator component then places the lowest fare that satisfies this travel criteria onto the data channel 300.

The fare cache component 325 correlates all the fare and availability information that is published on the data channel. The fare cache component (described with more detail in FIG. 8) also stores the fare and availability information satisfying the user's interest subscriptions. As updates to the fare and/or availability occur, the fare cache initiates the determination of new fare and availability information that satisfies the user's travel criteria.

The availability server component 330 provides availability information for all flights used by the present invention. The availability server component 330 (described with more detail in FIG. 6) may obtain its information from any source. For example, the SABRE Flight Reservation System, maintained by The SABRE Group, Inc., can be interfaced to the availability component to send real-time flight availability data. The availability server component 330 places the availability information, corresponding to fares generated by the fare generator 320, onto the data channel.

One skilled in the art will recognize that many execution and memory schemes can be used to implement the present invention. In addition, single or multiple computer systems may also be used in the implementation of the present invention. In one embodiment, the components, including the data channel and the network are executed and contained within a single computer's memory. This memory may be RAM, ROM, other memory structure or a combination thereof. However, this invention may also be implemented using virtual memory, a secondary storage medium and/or across multiple computers. These various configuration issues relate to an implementation preference and are considered within the scope of the present invention.

Publish-Subscribe Paradigm Used by the Data Channel

Figure 4 is a flow chart of the steps performed between a server and a client utilizing the publish-subscribe paradigm in a manner consistent with an exemplary embodiment of the present invention. The published-subscribe paradigm used by the data channel incorporates subject-based addressing technology. Utilizing subject-

based addressing, like that developed by Tibco, allows a server to distribute information to multiple clients without having to address the individual clients as well as not involving the server in the details of network addresses, protocols, packets, ports, or sockets. In general, information is sent (published) regarding a subject by a server. Clients listen for (subscribe to) specific subject names that are received over the data channel.

To use their publish-subscribe paradigm in the present invention, a client component requests a subscription for information with a server component based on a subject, using the data channel (Step 400). The server continually publishes information (i.e., sends data) as events occur (e.g., changes in fare or availability information) based on the subject requested by the client onto the data channel (Step 405). All clients connected to the data channel that have requested information on the same subject received the information received by the server on that subject (Step 410). The client will receive the information subscribed to in Step 400 until it is canceled by the client (Step 415) or by some other manner, such as a subscription timing out (not shown). In this manner, components (clients) connected to the data channel will be able to retrieve the same subject based while only requiring the server component to broadcast the information on the data channel once.

Subscription Service Component

Figure 5 is a flow chart of the steps performed by the subscription service in a manner consistent with the exemplary embodiment of the present invention. In one embodiment of the present invention, the subscription service manages all the interest subscriptions. The subscription service correlates an interest subscription request to the user making the request and insures that the information published in response to an interest subscription is made available to the user who requested it.

The subscription service receives the interest subscription request from the data channel (Step 500). Typically, this interest subscription is placed on the data channel by a user requesting travel information. The subscription service then catalogs the interest subscription (Step 505). By cataloging this information, the subscription service correlates a specific interest subscription to a requester and

therefore can manage the requests that are received from multiple users or other components.

After cataloging the interest subscription, the subscription service then publishes the request on the data channel (Step 510). The subscription server then waits for an event to occur. When an event occurs, such as receiving the fare and availability information from the data channel (Step 515), the subscription server takes the received information and correlates it to the interest subscription requested by a user. After determining which user requested the received information, the subscription service then publishes the fare and availability information on the data channel for the user who requested it (Step 520).

Other events (not shown) may also trigger action by the subscription service. For example, it is preferable that a time-out period be associated with interest subscriptions to prevent the unnecessary storage and processing of old and unwanted interest subscriptions. When the time-out event occurs for an interest subscription, the subscription service will publish the disinterest notification on the data channel indicating that the associated interest subscription is no longer valid.

Availability Server Component

Figure 6 is a flow chart of the steps performed by the availability server in a manner consistent with an exemplary embodiment with the present invention. The availability server receives the availability of seats in specific classes for flights used by the present invention (Step 600). The availability server is triggered by an event, such as receiving fare information from the data channel (Step 605). Responding to the event, the availability server then publishes availability information, corresponding to received fare information, on the data channel (Step 608). In addition, as the availability for flights change, the availability server will publish this change on the data channel (Step 610).

Fare Generator Component

Figure 7 is a flow chart of the steps performed by the fare generator in a manner consistent with the exemplary embodiment of the present invention. The fare generator receives travel criteria from the data channel (Step 700). The fare generator subscribes to any new non-duplicate interest subscriptions received from the data

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channel and published initially by the subscription service. Using travel criteria. obtained from interest subscription published on the data channel, and the fares database, the fare generator then generates the lowest fare that satisfies the travel criteria (Step 705).

To generate this lowest fare, the fare generator interfaces directly with the fares database, which provides all the fares for all the flights used by the present invention. After gathering the fares, the fare generator then searches for all the rules and conditions of travel associated with the market contained in the travel criteria. The fare generator then orders the fares and associated rules and conditions from low to high that satisfy the travel criteria. It is preferable that the ordering be done from low to high so that the availability search can continue uninterrupted if the lowest fare is not available. Following the generation of the lowest fare, the fare generator then publishes this lowest fare on the data channel (Step 710).

Fare Cache Component

Figure 8 is a flow chart of the steps performed by the fare cache in a manner consistent with an exemplary embodiment of the present invention. The fare cache component coordinates all the fare and availability information received on the data channel. In one embodiment, the fare cache initially receives an interest subscription, containing travel criteria, from the data channel (Step 800). The fare cache subscribes to interest subscriptions published by the subscription service. The fare cache then receives an event trigger (Step 805). If the event is a new request, such as one presented in Step 810, the fare cache then publishes, to the data channel, the travel criteria contained in the new request (Step 815). After receiving low fare and availability information from the data channel (Step 820) satisfying the travel criteria, the fare cache then determines the lowest available fare and publishes the lowest available fare on the data channel (Step 835). After publishing the lowest air fare, the fare cache then waits until the next event is triggered (Step 860).

If the event triggered in Step 805 is an availability change (Step 825), then the fare cache publishes a notification that the availability has changed (Step 830). Because an availability change may also affect a fare change, the fare cache then receives low fare as well as availability information from the data channel (Step 820).

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The fare cache then determines and publishes the lowest available air fare (Step 835). The fare cache then proceeds to wait for the next event (Step 860).

If the event triggered in Step 805 is a fare change (Step 840), for example indicated by an update from the fares database, then the fare cache publishes a notification of the fare change (Step 845). And as with an availability change, a change in fare may also affect availability. Therefore, the fare cache then receives new low fare and availability information from the data channel (Step 820). Using this information, the fare cache then determines and publishes the lowest available fare (Step 835) and proceeds to wait for the next event (step 860).

If the event triggered in Step 805 is a disinterest notification (Step 850), i.e., the timing out of an interest subscription, the fare cache then removes this interest subscription (Step 855), associated with the disinterest notification, from its storage and no longer retrieves fares and availability information for the "disinterested" interest subscription. The fare cache then proceeds to wait for the next event (Step 860).

The fare cache, as well as the other components described herein, in one embodiment of the present invention will be constantly running responding to events as they occur. For example, if one event triggers a disinterest notification, the fare cache will process this event. If, immediately following the disinterest notification event, a fare change event is received, the fare cache will process the fare change for those interest subscriptions to which the fare change applies.

Conclusion

A network and methods to distribute travel fare and travel availability information in a manner consistent with the present invention thus facilitates the distribution of changes to travel fare and travel availability information to the user. By providing a network, i.e., a data channel protocol using a publish-subscribe paradigm, users can receive both travel fare and travel availability information with a single request. In addition, users can subscribe to a component on the network and automatically receive any changes to travel fare or travel availability information without initiating additional requests. And furthermore, by utilizing the data channel, a single component can reply to requests generated by multiple components.

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It will be recognized by one skilled in the art that while this description discusses the invention in terms of air fares and flight availability. that the scope of this invention also includes other areas that involve pricing and availability including, but not limited to, rental cars, hotel rooms, cruise rates, tours, etc.

The foregoing description of an implementation of the invention has been presented for purposes of illustration and description. It is not exhaustive and does not limit the invention to the precise form disclosed. Modifications and variations are possible in light of the above teachings or may be acquired from practicing of the invention. For example, the described implementation includes software but the present invention may be implemented as a combination of hardware and software or in hardware alone. The invention may be implemented with both object-oriented and non-object-oriented programming systems. Additionally, although aspects of the present invention are described as being stored in memory, one skilled in the art will appreciate that these aspects can also be stored on other types of computer-readable media, such as secondary storage devices, like hard disks, floppy disks, or CD-ROM; a carrier wave from the Internet or other propagation medium; or other forms of RAM or ROM. The scope of the invention is defined by the claims and their equivalents.

WHAT IS CLAIMED IS:

1.   A method for distributing travel fare and travel availability information in a network, the method comprising the steps of:

.providing a data channel in the network for transmitting and receiving information among information providers and information users;

receiving registration requests to obtain information on changes in travel fare information and travel availability information; and

transmitting on the data channel from at least one of the information providers information on changes in the travel fare information and the travel availability information based on the registration requests.

2.   The method of claim 1, wherein the travel fare information is determined using travel criteria supplied in the registration requests.

3.   The method of claim 2 further including the step of transmitting on the data channel a lowest available fare derived from the travel criteria contained in the registration request.

4.   The method of claim 1, wherein the step of transmitting on the data channel from at least one of the information providers information on changes in the travel fare information and the travel availability, includes:

transmitting changes in the travel fare information by a fare generator on the data channel;

transmitting changes in the travel availability information by an availability server on the data channel; and

receiving changes in the travel fare information and travel availability information from the data channel by a fare cache.

5.   The method of claim 4 further including the step of determining new travel fare information and new travel availability information in response to receiving changes in the travel fare information and travel availability information.

6.   The method of claim 1 further comprising the step of receiving a request to remove the registration requests to obtain information on changes in travel fare information and travel availability information.

7.   The method of claim 2, wherein data channel, the network, the registration requests, the information users and the information providers and the information associated with determining the lowest available fare is contained in a single computer's memory.

8.   A system for distributing travel fare and travel availability information in a network, the system comprising:

means for providing travel fare information;

means for providing travel availability information;

means for registering user's request to obtain information reflecting changes in the travel fare information and the travel availability information; and

means for notifying users of changes in the travel fare information and the travel availability information based on the changes.

9.   The system of claim 8 further including:

means for determining a lowest available fare using the travel fare information and the availability information; and

means for notifying users of the lowest available fare.

10.   The system of claim 8 further including means for removing the user's requests.

11.   A travel information network, comprising:

a fare generator for providing travel fare information;

an availability server for providing travel availability information;

a subscription service for registering users seeking information reflecting changes in the travel fare information and the travel availability information; and

means for transmitting the changes in the travel fare information and the travel availability information to the registered users.

12.   The travel information network of claim 11 further including a fare cache for storing travel fare information and travel availability information.

13.   The travel information network of claim 12 further including means for determining a lowest available fare using the travel fare information and travel availability information.

14. A method for distributing travel fare and travel availability information in a network, the method comprising the steps of:

providing a data channel in the network for transmitting and receiving information among information providers and information users;

transmitting on the data channel from at least one of the information providers information on changes in the travel fare information and the travel availability information based on the registration requests; and

enabling users to access the data channel to retrieve information on changes in travel fare information and travel availability information based on registration information associated with each user.

15. The method of claim 14 further including the step of transmitting on the data channel a request to remove the registration requests.

16. The method of claim 14 further including the step of transmitting on the data channel a lowest available fare derived from the travel fare information and the travel availability information.

17. The method of claim 14, wherein the registration requests include travel criteria and the information on changes in the travel fare and travel availability information are related to the travel criteria.

18. A method for distributing travel fare and travel availability information in a network, the method comprising the steps of:

providing a data channel in the network for transmitting and receiving data packets among devices assigned to information providers and information users;

determining whether a data packet reflects a request from an information user to receive information reflecting changes in travel fare data and travel availability data; and

registering the request such that when a change occurs in the travel fare data or the travel availability data a data packet reflecting the change is provided on the data channel for receipt by at least one of the information user.

19. The method of claim 18, wherein the step of determining whether a data packet reflects a request from an information user includes the step of analyzing a subject portion of the data packet.

20.   The method of claim 18 further including the steps of:

transmitting the data packet on the data channel by one of the information providers; and

receiving the data packet by a plurality of information providers and information users.

21.   The method of claim 18 further including the step of removing the request such that the data packet reflecting the change is not received by the information user.

22.   The method of claim 18 further including the step of transmitting on the data channel from one of the information providers a lowest available fair derived from the travel fare data and the travel availability data.
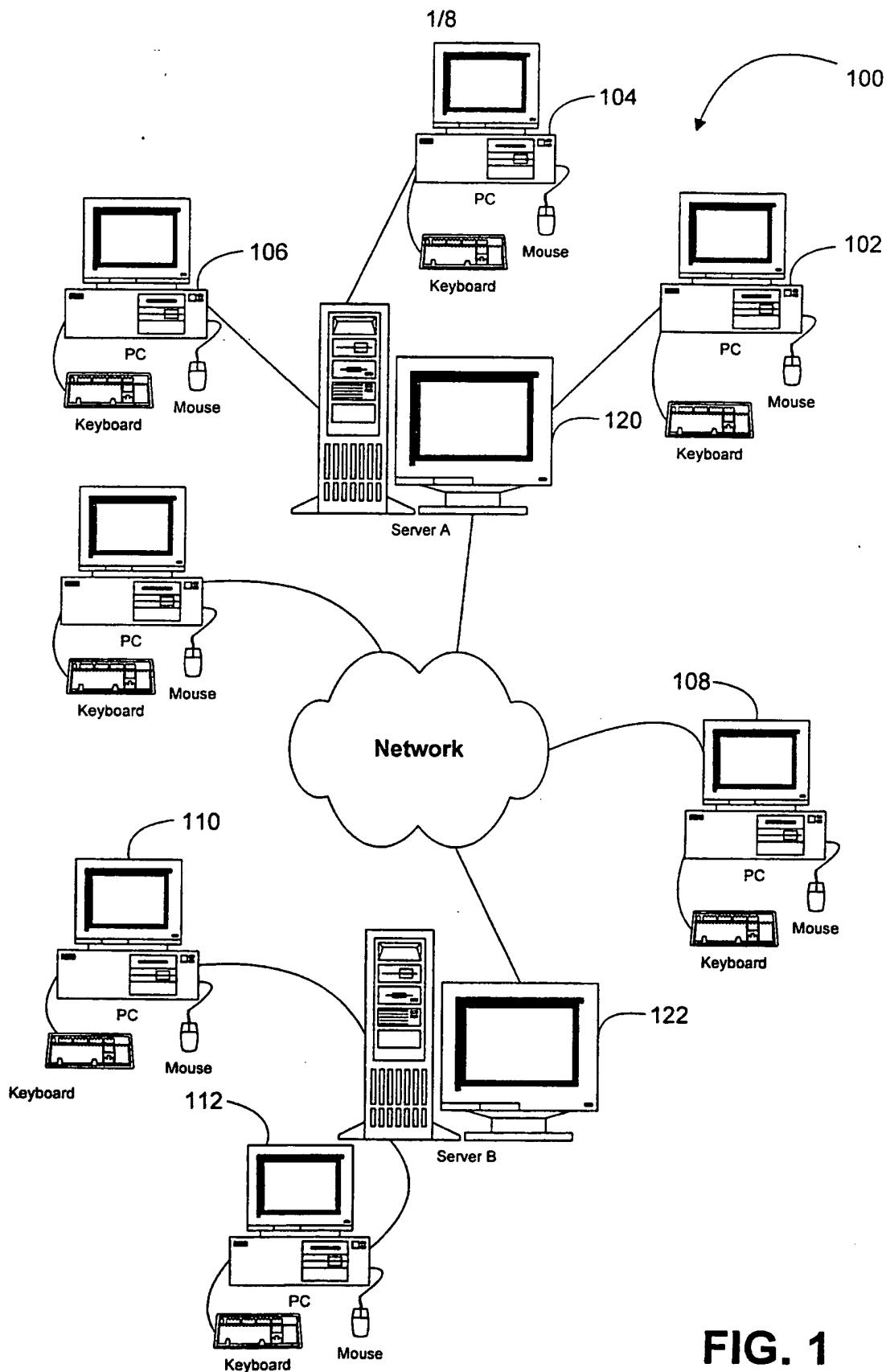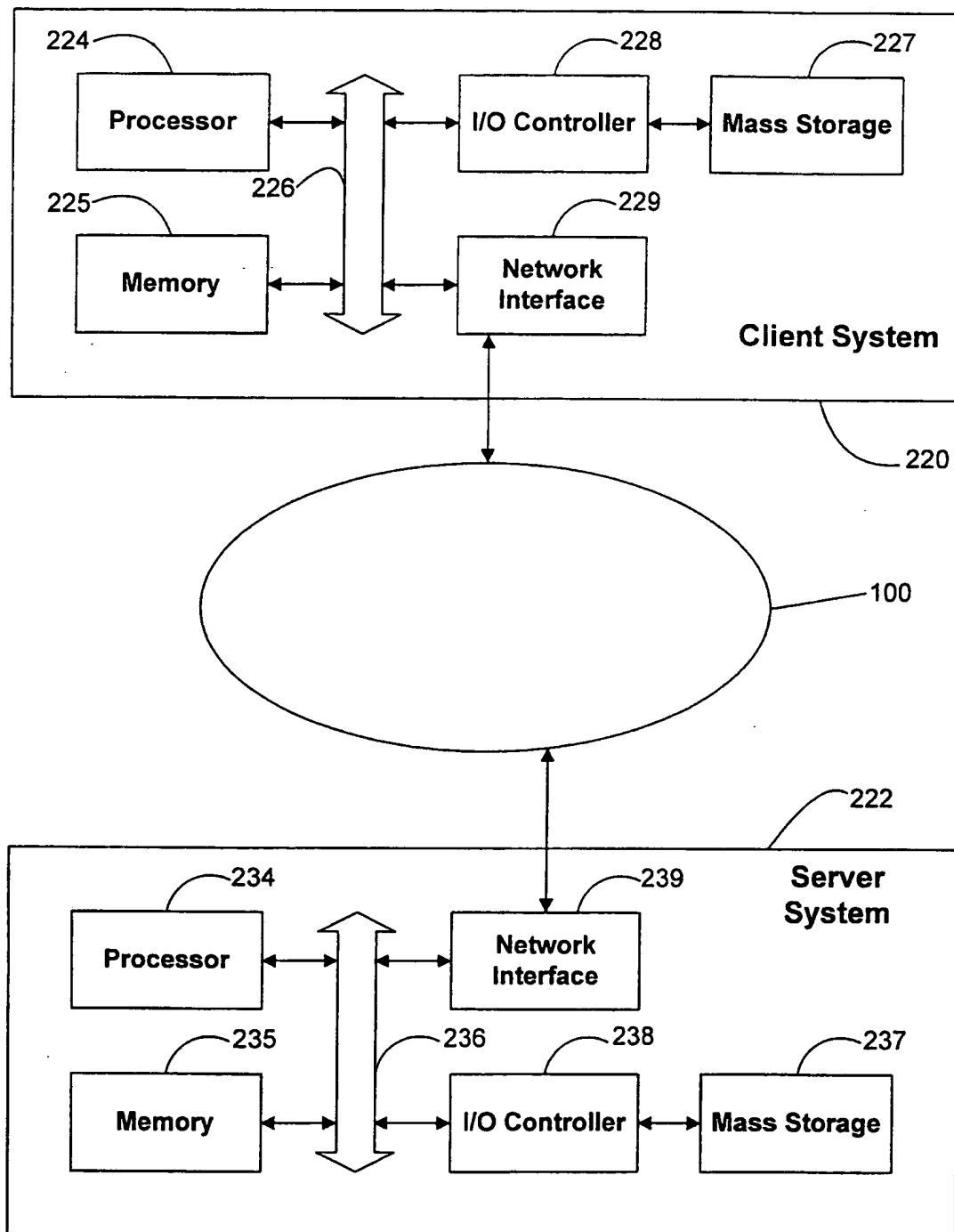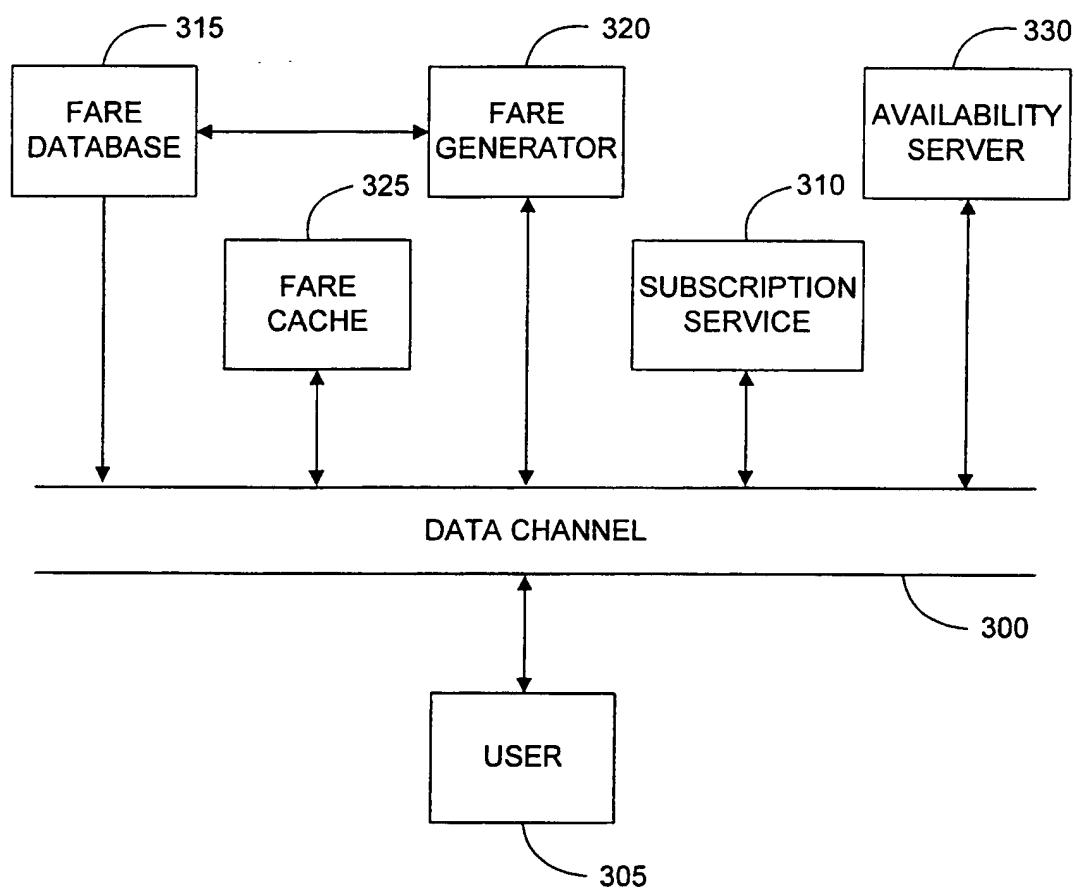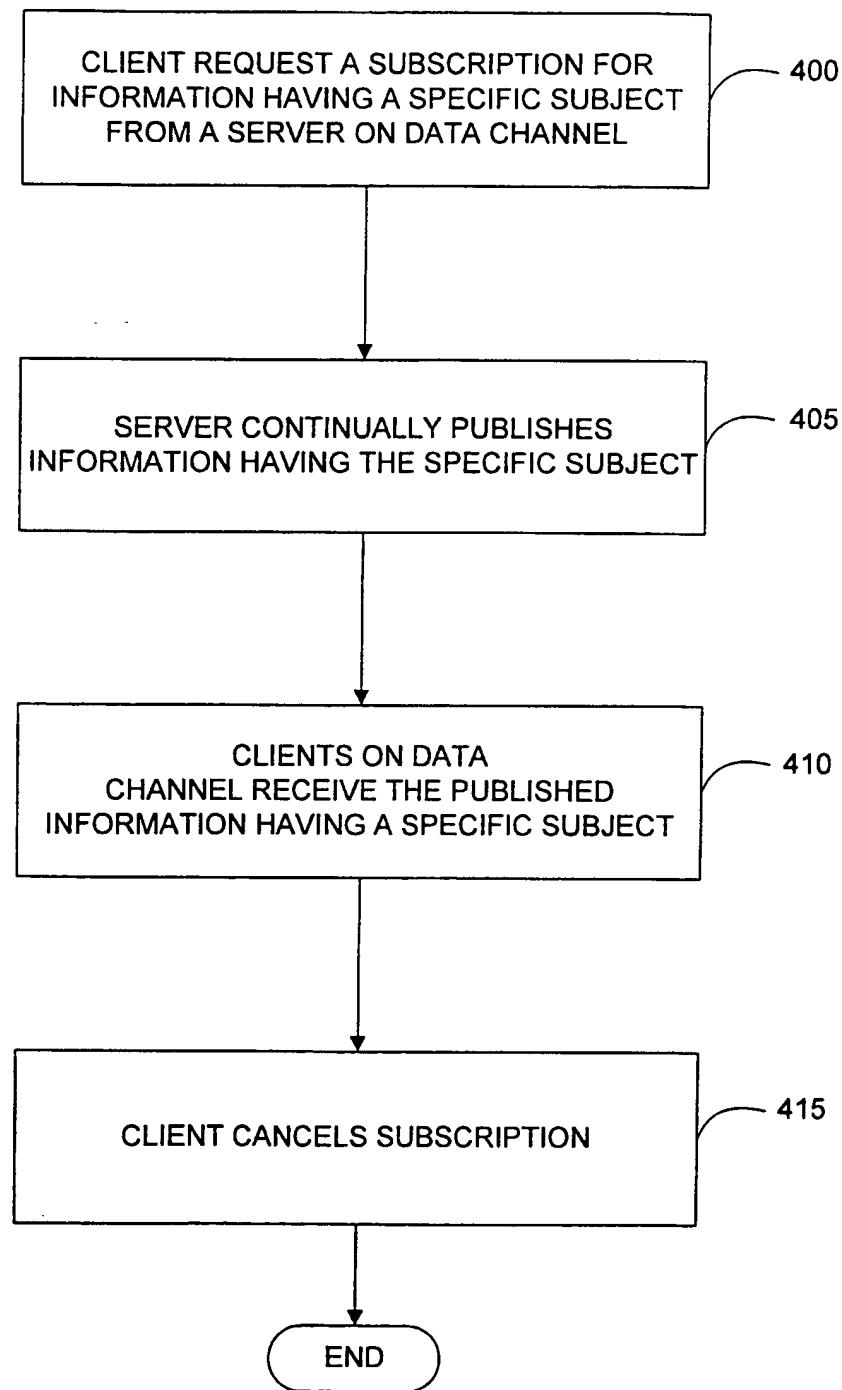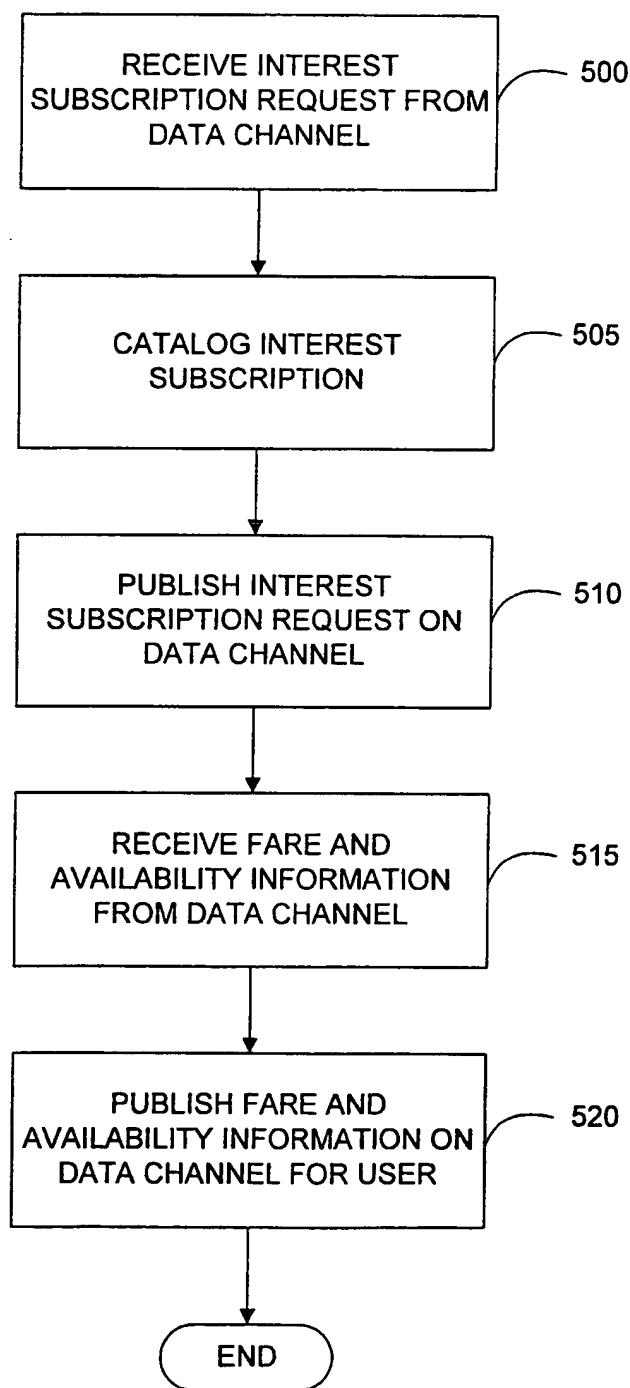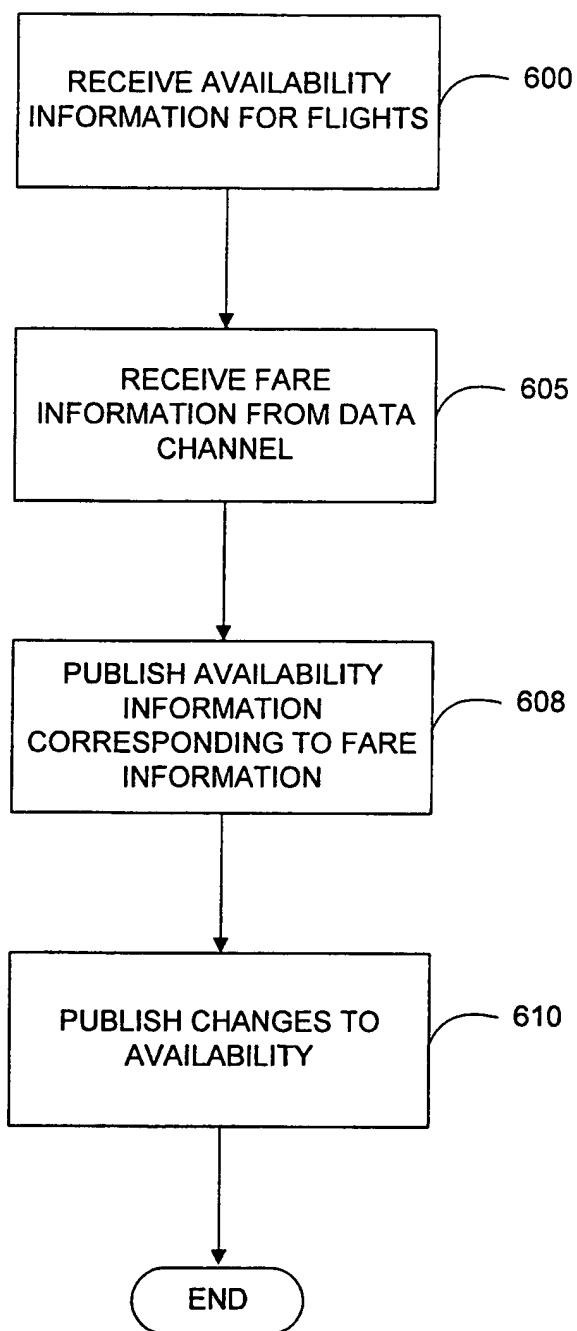
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FIG. 1

FIG. 2

FIG. 3

FIG. 4

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```
┌─────────────────────────┐
│   RECEIVE INTEREST      │
│ SUBSCRIPTION REQUEST FROM│ ─── 500
│     DATA CHANNEL        │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│    CATALOG INTEREST     │
│     SUBSCRIPTION        │ ─── 505
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│   PUBLISH INTEREST      │
│ SUBSCRIPTION REQUEST ON │ ─── 510
│     DATA CHANNEL        │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│    RECEIVE FARE AND     │
│ AVAILABILITY INFORMATION│ ─── 515
│   FROM DATA CHANNEL     │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│   PUBLISH FARE AND      │
│ AVAILABILITY INFORMATION ON│ ─── 520
│ DATA CHANNEL FOR USER   │
└─────────────────────────┘
             │
             ▼
         ╭─────────╮
         │   END   │
         ╰─────────╯
```

FIG. 5

```
                    ┌─────────────────────┐
                    │  RECEIVE AVAILABILITY │ ─── 600
                    │ INFORMATION FOR FLIGHTS│
                    └─────────────────────┘
                              │
                              ▼
                    ┌─────────────────────┐
                    │    RECEIVE FARE      │ ─── 605
                    │ INFORMATION FROM DATA │
                    │      CHANNEL          │
                    └─────────────────────┘
                              │
                              ▼
                    ┌─────────────────────┐
                    │ PUBLISH AVAILABILITY  │
                    │    INFORMATION        │ ─── 608
                    │ CORRESPONDING TO FARE │
                    │    INFORMATION        │
                    └─────────────────────┘
                              │
                              ▼
                    ┌─────────────────────┐
                    │  PUBLISH CHANGES TO   │ ─── 610
                    │     AVAILABILITY      │
                    └─────────────────────┘
                              │
                              ▼
                         (   END   )
```

FIG. 6

FIG. 7

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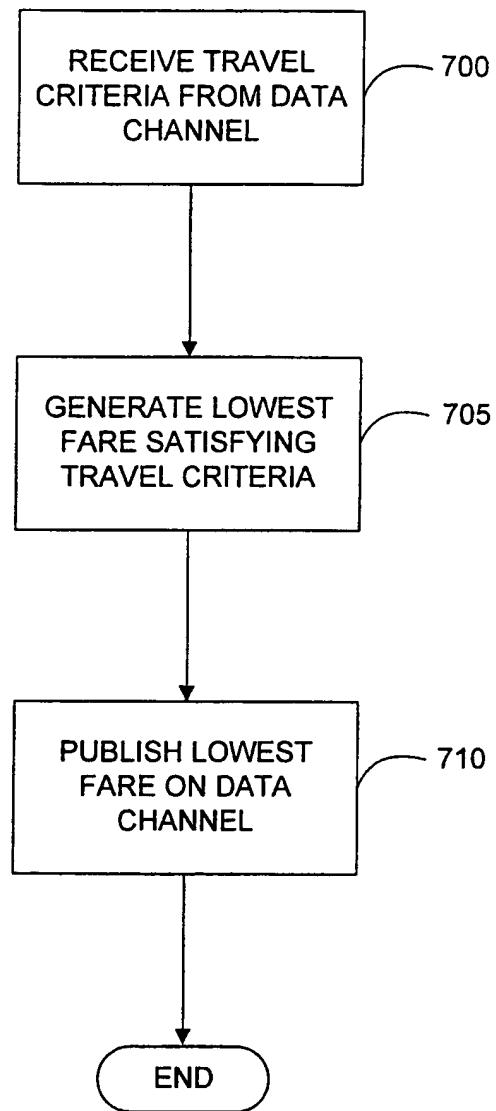
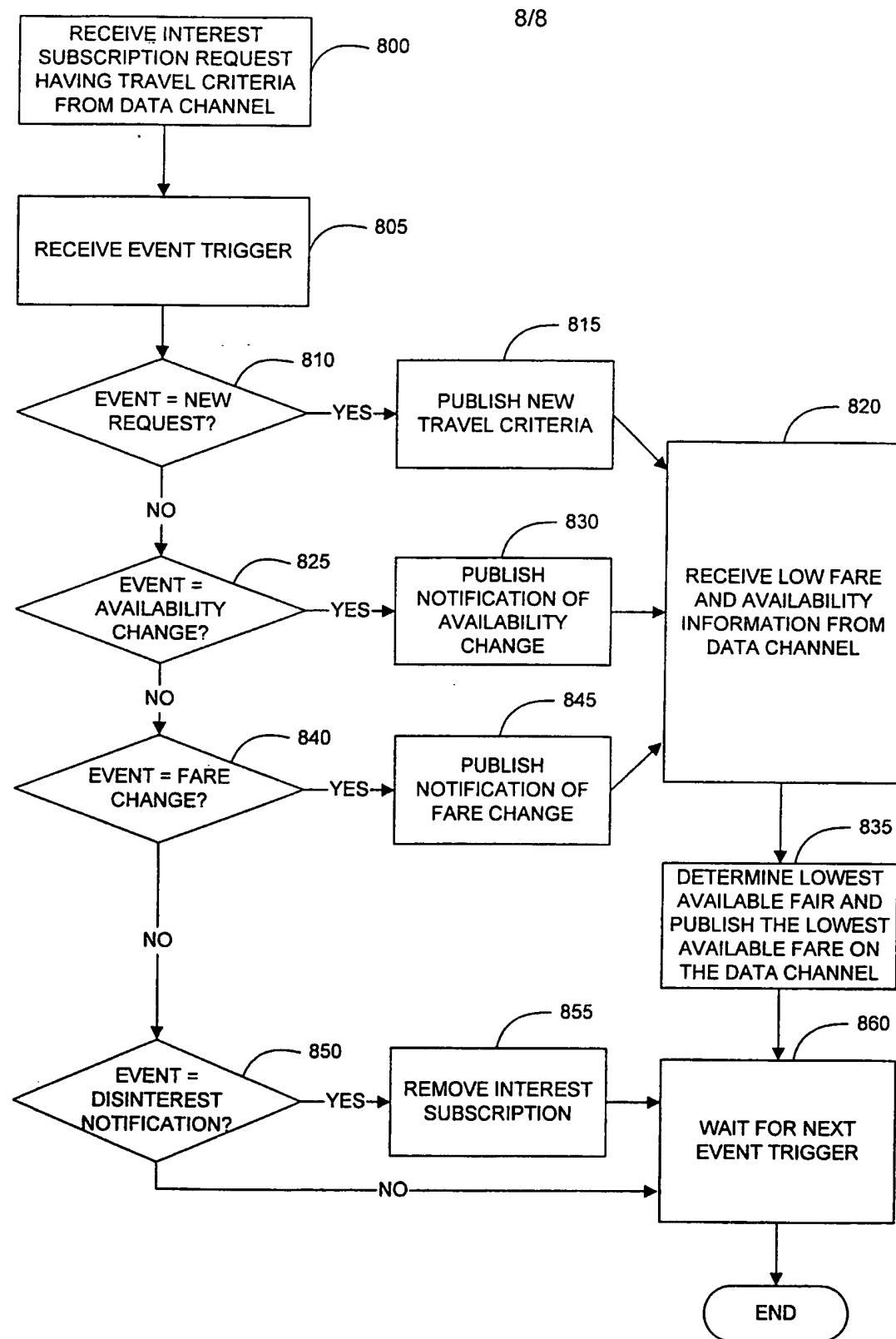**FIG. 8**

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   G06F17/60

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7   G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 797 127 A (CASE T SCOTT ET AL) 18 August 1998 (1998-08-18)	
A	WO 99 03029 A (WALKER ASSET MANAGEMENT LTD) 21 January 1999 (1999-01-21)	
A	US 5 270 921 A (HORNICK SCOT W) 14 December 1993 (1993-12-14)	
A	US 5 598 477 A (BERSON WILLIAM) 28 January 1997 (1997-01-28)	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 July 2000	19/07/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Crechet, P

Form PCT/ISA/210 (second sheet) (July 1992)

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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			EP 1012763 A		28-06-2000
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			WO 9212492 A		23-07-1992
US 5598477	A	28-01-1997	NONE		